The Earth System Grid (ESG)

PI's: Ian Foster (ANL), Dean Williams (PCMDI), &
Don Middleton (presenting), NCAR/SCD

On Behalf of the ESG Team

DOE SciDAC PI Meeting
Napa, Ca.
March 10-11, 2003

ESG

Scientific Discovery
through Advanced
Computing

The Earth System Grid

http://www.earthsystemgrid.org

- U.S. DOE SciDAC funded R&D effort
- Build an "Earth System Grid" that enables management, discovery, distributed access, processing, & analysis of distributed terascale climate research data
- A "Collaboratory Pilot Project"
- Build upon ESG-I, Globus Toolkit™, DataGrid technologies, and *deploy*
- Potential broad application to other areas

ESG

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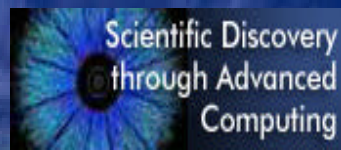
ESG Team

- ANL
  - Ian Foster (PI)
  - Veronika Nefedova
  - (John Bresenhan)
  - (Bill Allcock)
- LBNL
  - Arie Shoshani
  - Alex Sim
- ORNL
  - David Bernholdte
  - Kasidit Chanchio
  - Line Pouchard

- LLNL/PCMDI
  - Bob Drach
  - Dean Williams (PI)
- USC/ISI
  - Anne Chervenak
  - Carl Kesselman
  - (Laura Perlman)
- NCAR
  - David Brown
  - Luca Cinquini
  - Peter Fox
  - Jose Garcia
  - Don Middleton (PI)
  - Gary Strand
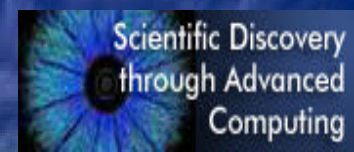
Primary ESG Servers

Mass storage, disk cache, and computation

Web and applications-based access to management, discovery, analysis, and visualization

NCAR: Climate change prediction and data archive

ANL: Globus and grid applications

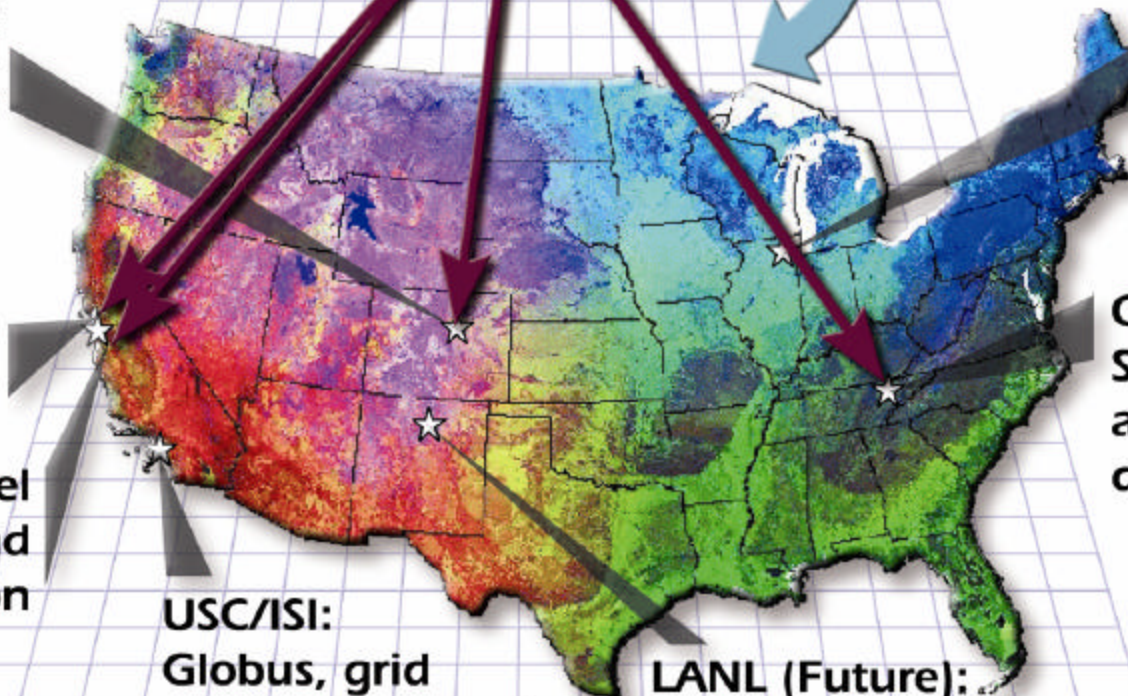LBNL/NERSC: Climate data archive

ORNL: Simulation and climate data archive

LLNL: Model diagnostics and inter-comparison

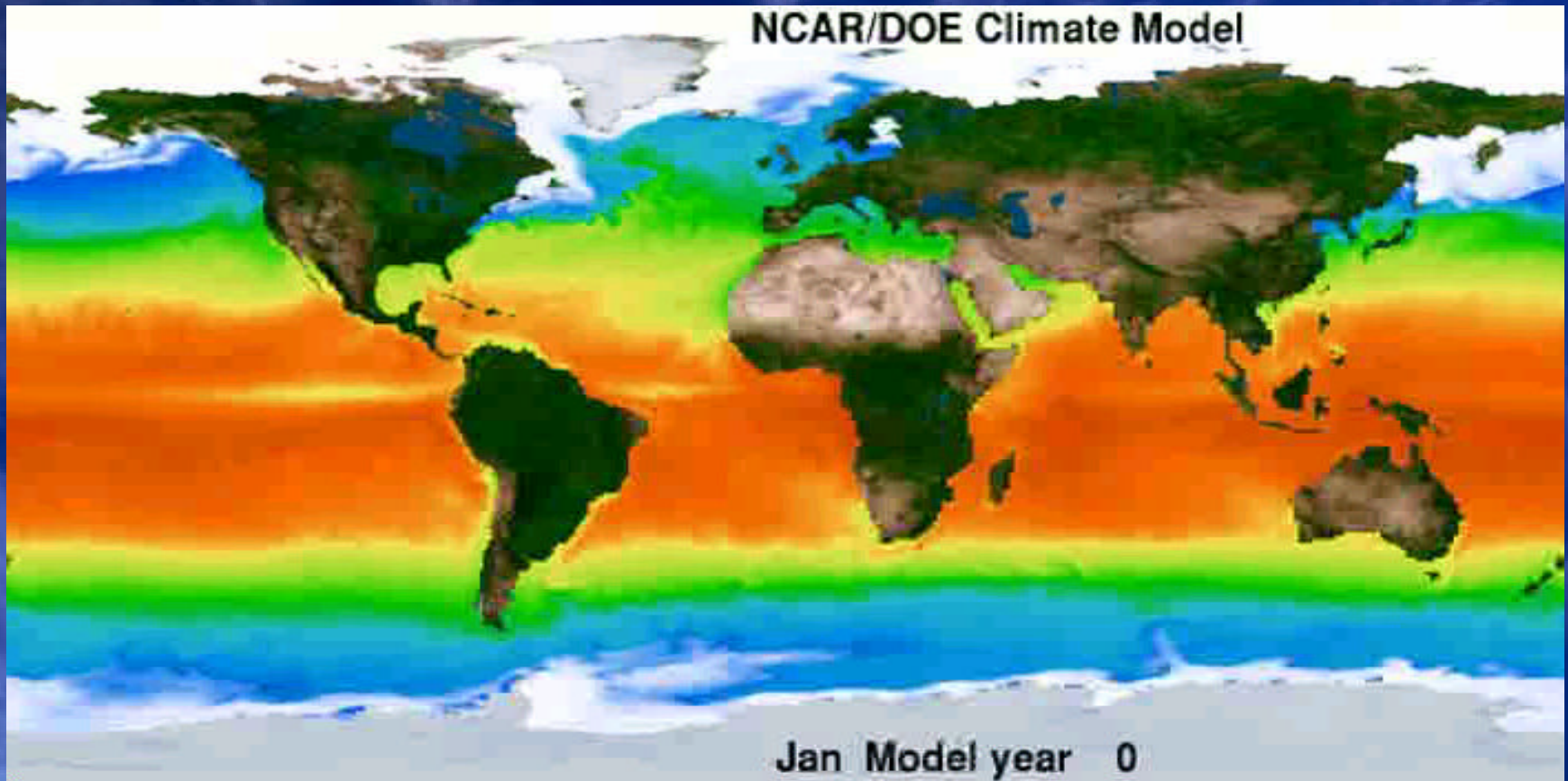USC/ISI: Globus, grid applications, and metadatabases

LANL (Future): Climate and ocean data archive

A Global Coupled Climate Model

NCAR/DOE Climate Model

Jan Model year 0

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The Earth System Grid

Scientific Discovery through Advanced Computing

Baseline Numbers

- T42 CCSM (current, 280km)
  - 7.5GB/yr, 100 years -> .75TB
- T85 CCSM (140km)
  - 29GB/yr, 100 years -> 2.9TB
- T170 CCSM (70km)
  - 110GB/yr, 100 years -> 11TB

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Capacity-related Improvements

Increased turnaround, model development, ensemble of runs

Increase by a factor of 10, linear data

- Current T42 CCSM
  - 7.5GB/yr, 100 years -> .75TB * 10 = 7.5TB
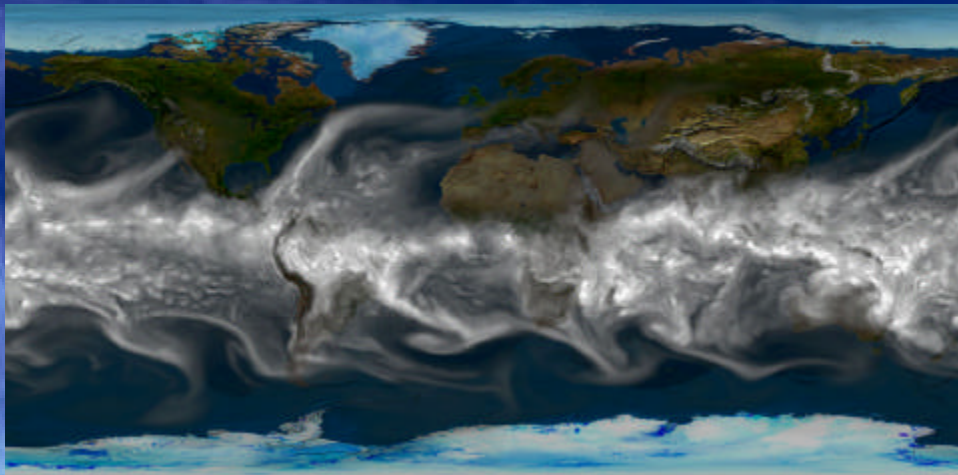
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Capability-related Improvements

Spatial Resolution: T42 -> T85 -> T170
Increase by factor of ~ 10-20, linear data

Temporal Resolution: Study diurnal cycle, 3 hour data
Increase by factor of ~ 4, linear data

CCM3 at T170 (70km)

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Capability-related Improvements

Quality: Improved boundary layer, clouds, convection, ocean physics, land model, river runoff, sea ice
Increase by another factor of 2-3, data flat

Scope: Atmospheric chemistry (sulfates, ozone…), biogeochemistry (carbon cycle, ecosystem dynamics), middle Atmosphere Model…
Increase by another factor of 10+, linear data

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Approaching Mesoscale (i.e. "weather") Resolution

05:00:00
06 Jul 93
5 of 24
Tuesday
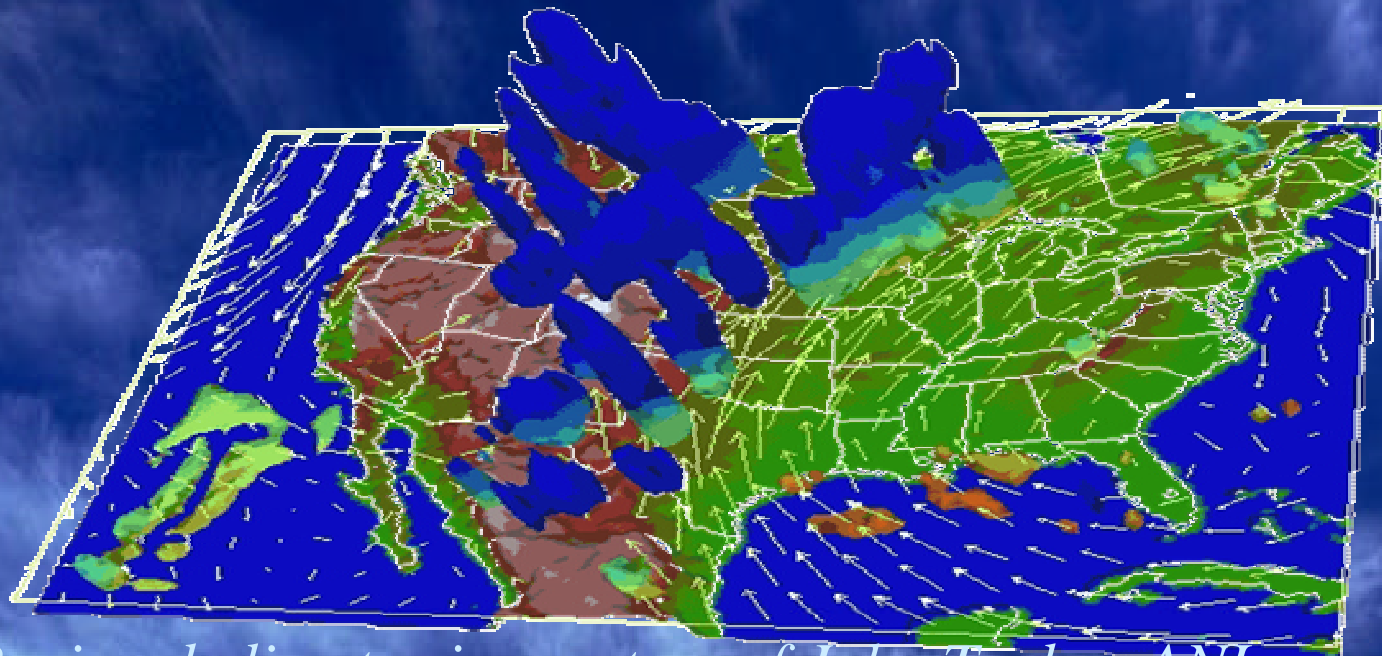
Regional climate vis courtesy of John Taylor, ANL

Vis5D

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Model Improvements cont.

Grand Total:

Increase compute by a Factor O(1000-10000)

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We Will Examine Practically Every Aspect of the Earth System from Space in This Decade

Longer-term Missions - Observation of Key Earth System Interactions

Terra

Landsat 7

Aqua

Aura

QuikScat

ICEsat

Jason-1
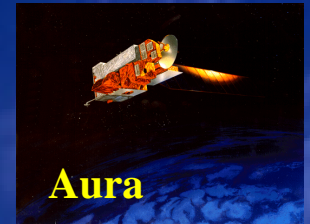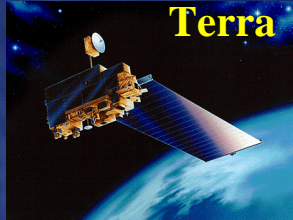
Exploratory - Explore Specific Earth System Processes and Parameters and Demonstrate Technologies

Triana

VCL

SRTM

GRACE

PICASSO

Cloudsat

EO-1

ESG

The Earth System Grid

Discovery
Advanced
Computing
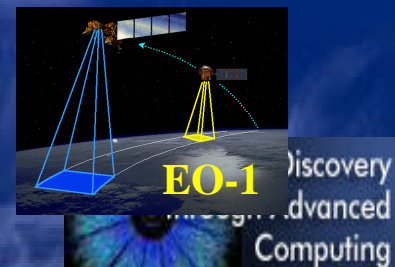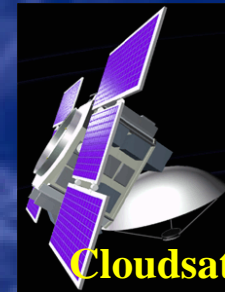
ESG: Challenges

- Enabling the simulation and data management team

- Enabling the core research community in analyzing and visualizing results

- Enabling broad multidisciplinary communities to access simulation results

We need integrated scientific work environments that enable smooth WORKFLOW for knowledge development: computation, collaboration & collaboratories, data management, access, distribution, analysis, and visualization.

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The Earth System Grid

ESG: Strategies

- Move data a minimal amount, keep it close to computational point of origin when possible
  - *Data access protocols, distributed analysis*
- When we must move data, do it fast and with a minimum amount of human intervention
  - *Storage Resource Management, fast networks*
- Keep track of what we have, particularly what's on deep storage
  - *Metadata and Replica Catalogs*
- Harness a federation of sites, web portals
  - *Globus Toolkit -> The Earth System Grid -> The UltraDataGrid*

ESG

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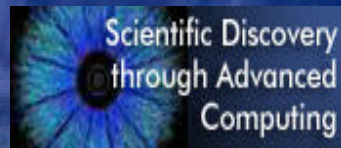
Storage/Data Management

HRM

Tera/Peta-scale
Archive

Server

Tools for reliable staging, transport, and replication

HRM
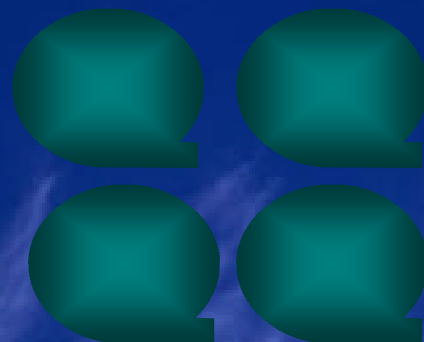
Server

Tera/Peta-scale
Archive

Client
Selection
Control
Monitoring

HRM

The Earth System Grid

HRM aka "DataMover"

- Running well across DOE/HPSS systems
- New component built that abstracts NCAR Mass Storage System
- Defining next generation of requirements with climate production group
- First "real" usage

"The bottom line is that it now works fines and is over 100 times faster than what I was doing before. As important as two orders of magnitude increase in throughput is, more importantly I can see a path that will essentially reduce my own time spent on file transfers to zero in the development of the climate model database" – Mike Wehner, LBNL

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OPeNDAP

An Open Source Project for a Network Data Access Protocol

(originally DODS, the Distributed Oceanographic Data System)
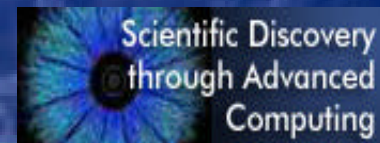
Distributed Data Access Protocols

OPeNDAP-g
-Transparency
-Performance
-Security
-Authorization
-(Processing)

Typical Application

Distributed Application

Application
netCDF lib

data

Data
(local)

Application
OPeNDAP Client

OPeNDAP
Via
http

| OpenDAP Server |

Data
(remote)

Application
ESG client

OPeNDAP
Via
Grid

ESG
+
DODS

| ESG Server |

Big Data
(remote)

ESG
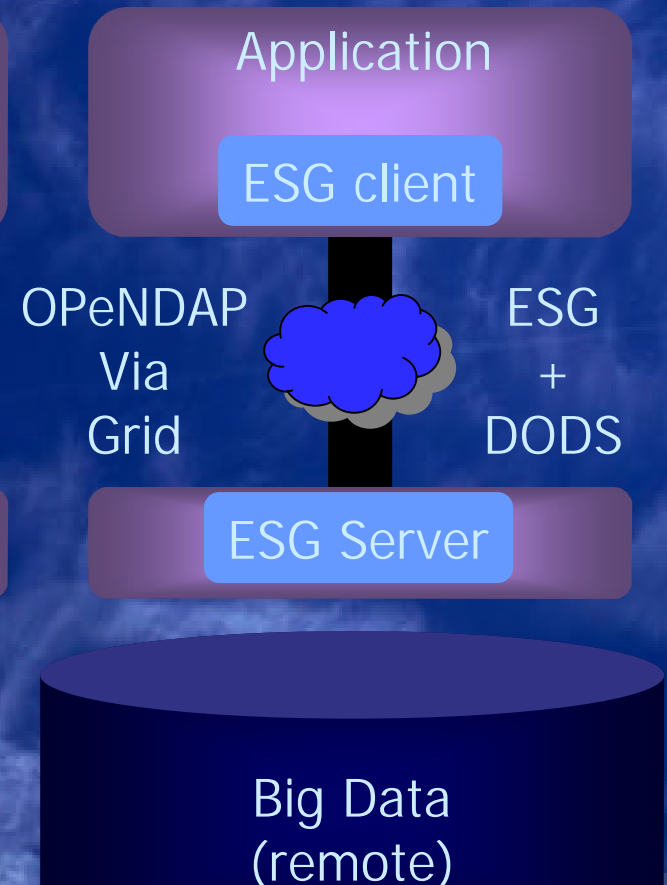
The Earth System Grid

Computing

ESG: Metadata Services

ESG CLIENTS API & USER INTERFACES

PUBLISHING   ANALYSIS & VISUALIZATION

SEARCH & DISCOVERY   ADMINISTRATION   BROWSING & DISPLAY

HIGH LEVEL METADATA SERVICES

METADATA EXTRACTION   METADATA ANNOTATION   METADATA & DATA REGISTRATION   METADATA BROWSING   METADATA QUERY

METADATA AGGREGATION   METADATA VALIDATION   METADATA DISPLAY   METADATA DISCOVERY

CORE METADATA SERVICES

METADATA ACCESS (update, insert, delete, query)   SERVICE TRANSLATION LIBRARY

METADATA HOLDINGS

Data & Metadata Catalog   Dublin Core Database   mirror Dublin Core XML Files   COARDS Database   COMMENTS XML Files

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The Earth System Grid

Metadata Status

- Co-developed NcML with Unidata
  - CF conventions in progress, almost done
- Developed & evaluated a prototype metadata system
- Finalizing a specific schema for PCM/CCSM
- Addressing interoperability with federal standards and NASA/GCMD via the generation of DIF/FGDC/ISO
- Addressing interoperability with digital libraries via the creation of Dublin Core
- Working with U.K. e-Science on schema sharing
- Experimenting with relational and native XML databases
- Exploratory work for first-generation ontology
- Catalog population begins this month

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ESG: NcML Core Schema

- For XML encoding of metadata (and data) of any generic netCDF file
- Objects: netCDF, dimension, variable, attribute
- Beta version reference implementation as Java Library (http://www.scd.ucar.edu/vets/luca/netcdf/extract_metadata.htm)
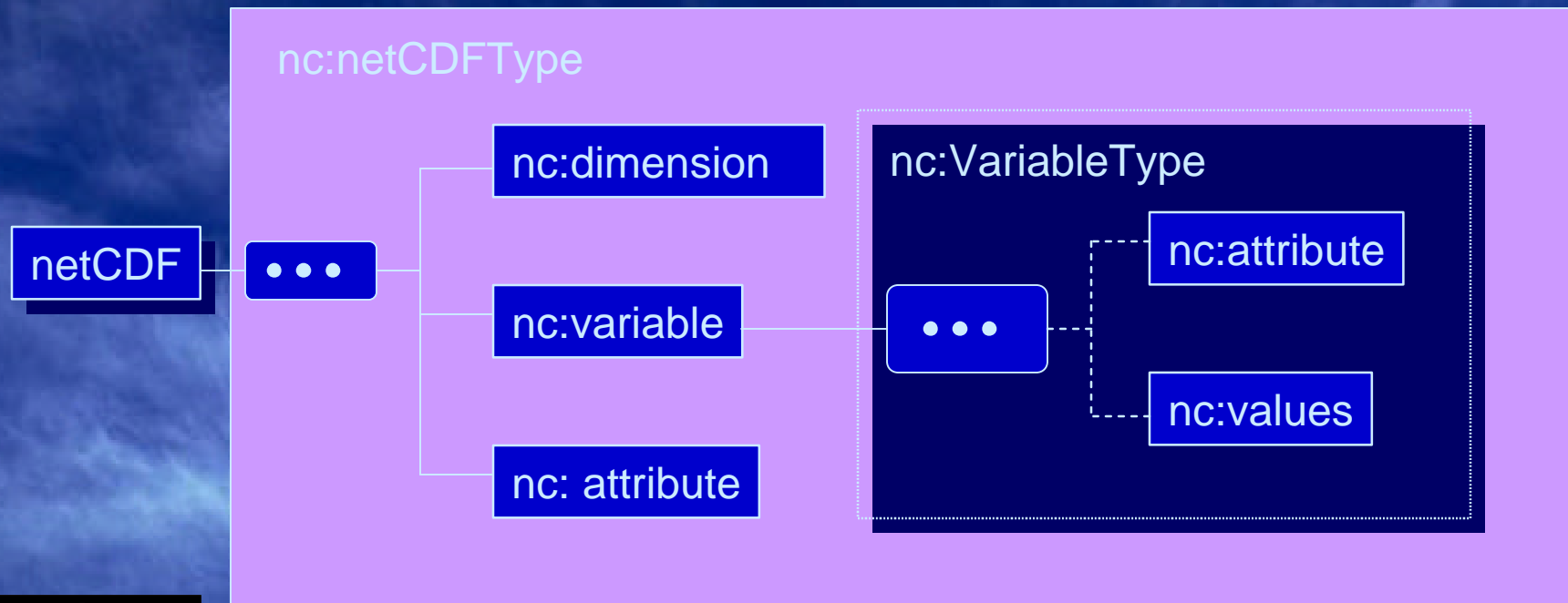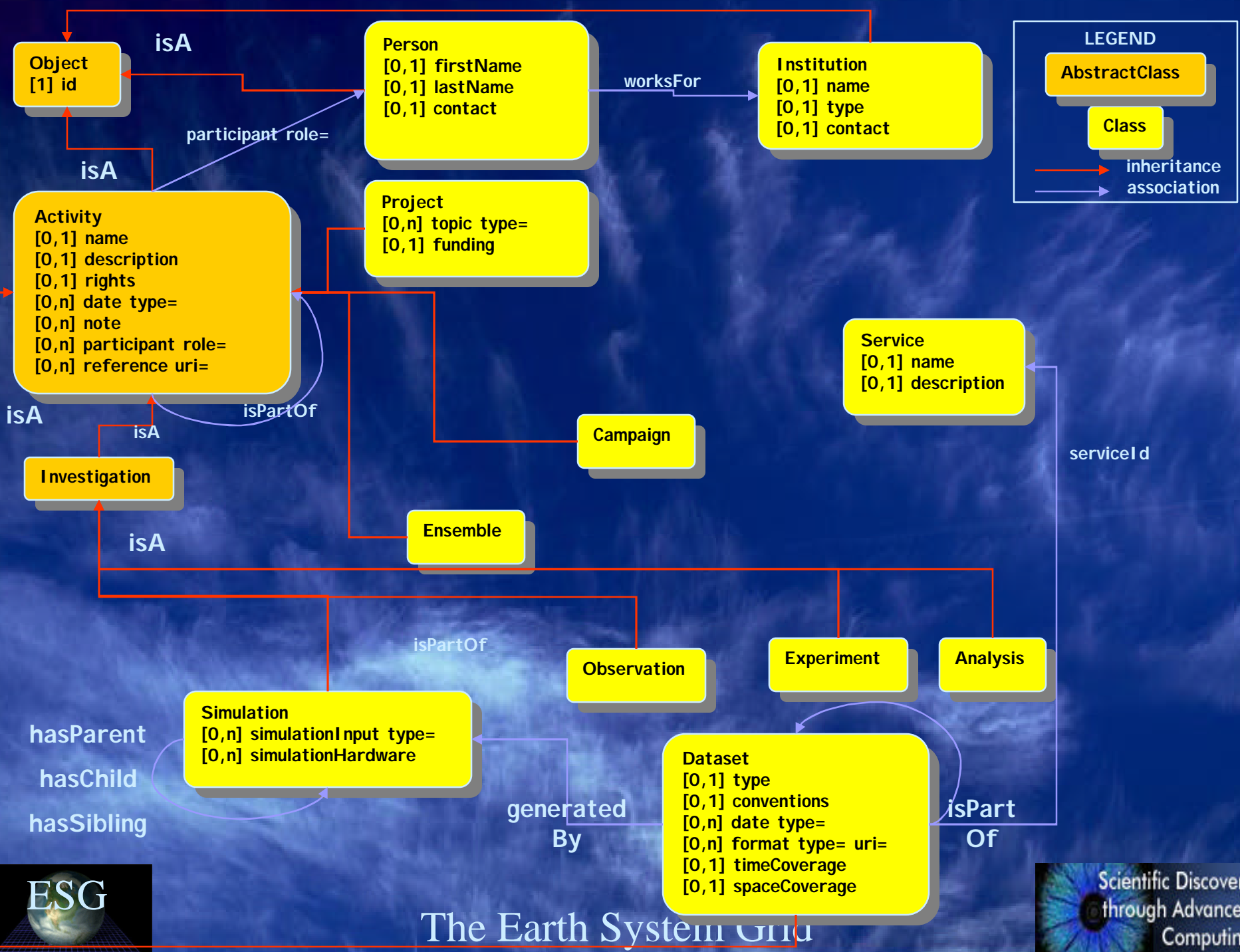
ESG

Scientific Discovery through Advanced Computing

isA

Object
[1] id

Person
[0,1] firstName
[0,1] lastName
[0,1] contact

worksFor

Institution
[0,1] name
[0,1] type
[0,1] contact

isA

participant role=

isA

Activity
[0,1] name
[0,1] description
[0,1] rights
[0,n] date type=
[0,n] note
[0,n] participant role=
[0,n] reference uri=

Project
[0,n] topic type=
[0,1] funding

Service
[0,1] name
[0,1] description

isPartOf

isA

Investigation

Campaign

serviceId

isA

Ensemble

Observation

Experiment

Analysis

isPartOf

hasParent

hasChild

hasSibling

Simulation
[0,n] simulationInput type=
[0,n] simulationHardware

generated
By

Dataset
[0,1] type
[0,1] conventions
[0,n] date type=
[0,n] format type= uri=
[0,1] timeCoverage
[0,1] spaceCoverage

isPart
Of

ESG

The Earth System Grid

Scientific Discovery
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Computing

SC2002 Demonstration

LBNL

- HPSS High Performance Storage System
- disk
- openDAPg server
- SRM Storage Resource Management
- CAS-enabled Striped-gridFTP server
- gridFTP server

LLNL

- disk
- openDAPg server
- SRM Storage Resource Management
- CAS-enabled Striped-gridFTP server
- gridFTP server

ISI

- MCS Metadata Cataloguing Services
- RLS Replica Location Services

NCAR

- Striped gridFTP client
- MyProxy server
- MyProxy client
- MCS client
- RLS client
- TOMCAT Servlet engine
- GRAM gatekeeper
- openDAPg server
- CAS client
- gridFTP server
- SRM Storage Resource Management
- LAS Live Access Server
- MSS Mass Storage System
- disk

ANL

- CAS Community Authorization Services
- CAS-enabled Striped-gridFTP server

ORNL

- gridFTP server
- SRM Storage Resource Management
- disk
- HPSS High Performance Storage System

gridFTP

SOAP

RMI

The Earth System Grid

Collaborations & Relationships

- CCSM Data Management Group
- The Globus Project
- Other SciDAC Projects: Climate, Security & Policy for Group Collaboration, Scientific Data Management ISIC, & High-performance DataGrid Toolkit
- OPeNDAP/DODS (multi-agency)
- NSF National Science Digital Libraries Program (UCAR & Unidata THREDDS Project)
- U.K. e-Science and British Atmospheric Data Center
- NOAA NOMADS and CEOS-grid
- Earth Science Portal group (multi-agency, intnl.)

ESG

The Earth System Grid

Scientific Discovery through Advanced Computing
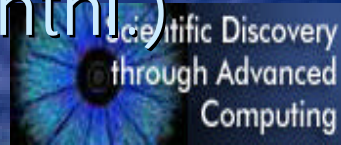
Immediate Directions

- Broaden usage of DataMover and refine
- Build data catalogs with rich metadata
- Release "real" ESG portal
  - Search, browse, access
- Alpha version of OPeNDAPg
  - Test and evaluate with three client applications (ncview, CDAT, & NCL)
- Move software and web portals into the hands of serious users, and get feedback!
- Later: OGSA, server-side analysis

Closing Thoughts

- Building an environment for the long-term
  - Difficult, expensive, and time-consuming
  - But a worthwhile investment
- Team-building is a critical process
  - Collaboration technologies really help
- Managing all the collaborations is a challenge
  - But extremely valuable
- Good progress, first real usage

ESG

The Earth System Grid

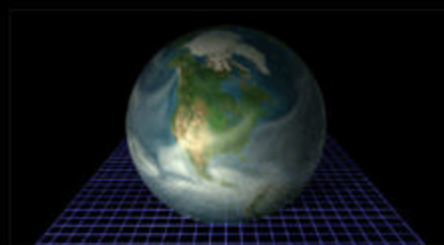Scientific Discovery through Advanced Computing

THE EARTH SYSTEM GRID

ESG

Scientific Discovery through Advanced Computing

The Earth System Grid II:

Turning Climate Model Datasets Into Community Resources

About ESG

(public access)

Home

Overview

People

Calendar

Public Documents

Contact Us

The Earth System Grid II (ESG) is a new research project sponsored by the U.S. DOE Office of Science under the auspices of the Scientific Discovery through Advanced Computing program (SciDAC). The primary goal of ESG is to address the formidable challenges associated with enabling analysis of and knowledge development from global Earth System models. Through a combination of Grid technologies and emerging community technology, distributed federations of supercomputers and large-scale data & analysis servers will provide a seamless and powerful environment that enables the next generation of climate research.

Project Abstract

ESG at Work

(registration required)
under construction

New User Registration

Login

Data Discovery

Extract Metadata

Browse Data Catalog

Metadata Query

High-resolution, long-duration simulations performed with advanced DOE SciDAC/NCAR climate models will produce tens of petabytes of output. To be useful, this output must be made available to global change impacts researchers nationwide, both at national laboratories and at universities, other research laboratories, and other institutions. To this end, we propose to create a new Earth System Grid, ESG-II - a virtual collaborative environment that links distributed centers, users, models, and data. ESG-II will provide scientists with virtual proximity to the distributed data and resources that they require to perform their research. The creation of this environment will significantly increase the scientific productivity of U.S. climate researchers by turning climate datasets into community resources. In creating ESG-II, we will integrate and extend a range of Grid and collaboratory technologies, including the DODS remote access protocols for environmental data, Globus Toolkit technologies for authentication, resource discovery, and resource access, and Data Grid technologies developed in other projects. We will develop new technologies for

THE EARTH SYSTEM GRID

ESG

Scientific Discovery through Advanced Computing
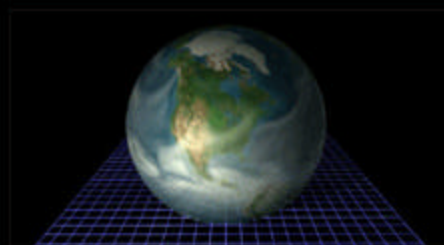
ESG Home	ESG Login	CAS proxy	ESG Logout	ESG @ Work:

ESG LOGIN

INSTRUCTIONS: please log into the ESG system through one of the authentication methods below.

▶ **ANONYMOUS MYPROXY LOGIN** Creates anonymous proxy on dataportal.ucar.edu with two hours lifetime

ANONYMOUS USERNAME: ESGuser   **ANONYMOUS PASSWORD:** ******** →

▶ **AUTHENTICATED MYPROXY LOGIN** Retrieves delegated credentials from specified MyProxy server

MYPROXY USERNAME: _____   **MYPROXY PASSWORD:** _____   **HOST:** NCAR (dataportal) →

▶ **AUTHENTICATED GLOBUS PROXY LOGIN** Loads previously created Globus proxy from dataportal.ucar.edu

Edit   View   Go   Bookmarks   Tools   Window   Help

Back   Forward   Reload   Stop

https://dataportal.ucar.edu:8443/esg/index.jsp

Search   Print

Mail   AIM   Home   Radio   Netscape   Search   Shop   Bookmarks   ACD   CNN   ESG   GAZZETTA   GLOBUS   NETS   SCD   VETS   UCAR

Earth System Grid

ESG @ WORK APPLICATIONS INDEX

Data Search and Discovery

ESG Data Discovery

This integrated application allows identification of data (logical files and replica locations) based on a query to the ESG Metadata Catalog and Replica Catalog, display of logical files and logical collections metadata, and transfer of files.

Browse ESG Data Catalogs

Hierarchical browsing of ESG Data Catalogs in THREDDS format, and display of associated metadata.

Query ESG Metadata Catalog

Query of static and user defined attributes associated with logical collections or logical files in the ESG Metadata Catalog.

Data Management

Data Transfer

Web interface to HRM (Hierarchical Resource Manager). HRM allows high speed, reliable, parallel streams, multiple files transfer between permanent storage systems and ESG nodes.

Metadata Extraction

Web Service for the automatic extraction of metadata in NcML format from any network retrievable netcdf file.

Data Analysis and Visualization

DODS

Access to the ESG DODS servers.

LAS

Access to the ESG LAS servers.

CDAT

Access to the ESG CDAT servers.

ESG System

Monitor Status

Monitor the status and availability of the resources comprising the ESG system.

Query Logs

Interactive query of log files recording ESG access and usage.

CKNOWLEDGMENTS: ESG applications are based on a variety of computing and information technologies. In particular, we wish to acknowledge e use of Globus technology and related COG (Commodity Grid Kit) toolkits.

Earth System Grid

ESG

Through Advanced Computing

ESG Home   **ESG Login**   **CAS proxy**   **ESG Logout**   **ESG @ Work:**

ESG DATA DISCOVERY

INSTRUCTIONS: This interface allows search and discovery of data through associated metadata. Using the user filled parameters, a query is first performed to the **MCS (Metadata Cataloguing Services)** to retrieve all matching logical files. Then a second query is performed to the RLS (Replica Location Services) to find all registered replica locations, sizes, and access services for each logical file. The user may select replicas on disk or remote storage (**HPSS, MSS**) and transfer them with the **SRM (Storage Resource Manager)**; or the user may select and access replicas served by distributed **striped gridFTP openDAP** servers. Optionally, the user may also view the metadata (stored in the MCS) associated with a logical collection or logical file. Please note that currently the query supports only a limited number of parameters.

QUERY FORM

LOGICAL COLLECTION NAME PCM/B06.20/atm   (required) ▶ **DISPLAY COLLECTION LEVEL METADATA**

VARIABLE NAME _____ (optional)

START YEAR 1980   (required)

STOP YEAR 1985   (required)

⊕ **SUBMIT QUERY**

SESION ID: 00AFCA2870A97FD8E572993D94F16BBB   **PROXY TIME LEFT:** 7107 secs

CN: CN=proxy,CN=proxy,CN=proxy,CN=Globus User,OU=Network Engineering and Technology Section,OU=Scientific Computing Division,O=National Center for Atmospheric Research,O=Globus,C=us

Document: Done (0.271 secs)

QUERY RESULTS
NUMBER OF RESULTS FOUND: 5

LOGICAL FILE /PCM/B06.20/atm/B06.20.atm.1980.nc
SIZE 268722384
REPLICAS ● /raid/f1/ESG_SC2002/PCM/B06.20/atm/B06.20.atm.1980.nc [DISKatNCAR DODSatNCAR]
○ /dataportal.ucar.edu/PCM1/pcm/B06.20/atm/B06.20.atm.1980.nc [MSSatNCAR]
○ /hpss.ccs.ornl.gov/home/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1980.nc [HPSSatORNL]
○ /archive.nersc.gov/nersc/gc5/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1980.nc [HPSSatLBNL]
○ /data/esg/sc2002/PCM/B06.20/atm/B06.20.atm.1980.nc [DISKatLBNL DODSatLBNL]
▶ DISPLAY METADATA

LOGICAL FILE /PCM/B06.20/atm/B06.20.atm.1981.nc
SIZE 322461980
REPLICAS ○ /raid/f1/ESG_SC2002/PCM/B06.20/atm/B06.20.atm.1981.nc [DISKatNCAR DODSatNCAR]
● /dataportal.ucar.edu/PCM1/pcm/B06.20/atm/B06.20.atm.1981.nc [MSSatNCAR]
○ /hpss.ccs.ornl.gov/home/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1981.nc [HPSSatORNL]
○ /archive.nersc.gov/nersc/gc5/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1981.nc [HPSSatLBNL]
○ /data/esg/sc2002/PCM/B06.20/atm/B06.20.atm.1981.nc [DISKatLBNL DODSatLBNL]
▶ DISPLAY METADATA

LOGICAL FILE /PCM/B06.20/atm/B06.20.atm.1982.nc
SIZE 322461980
REPLICAS ○ /raid/f1/ESG_SC2002/PCM/B06.20/atm/B06.20.atm.1982.nc [DISKatNCAR DODSatNCAR]
○ /dataportal.ucar.edu/PCM1/pcm/B06.20/atm/B06.20.atm.1982.nc [MSSatNCAR]
● /hpss.ccs.ornl.gov/home/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1982.nc [HPSSatORNL]
○ /archive.nersc.gov/nersc/gc5/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1982.nc [HPSSatLBNL]
○ /data/esg/sc2002/PCM/B06.20/atm/B06.20.atm.1982.nc [DISKatLBNL DODSatLBNL]
▶ DISPLAY METADATA

LOGICAL FILE /PCM/B06.20/atm/B06.20.atm.1983.nc

ESG METADATA CATALOG QUERY

INSTRUCTIONS: This page allows to retrieve all types of metadata associated with a given **logical collection** or **logical file** in the ESG Metadata Catalog. Metadata in the MCS can be stored in the form of **static attributes**, **user-defined attributes**, or **XML**.

QUERY FORM

OBJECT TYPE   Logical File ▼

OBJECT NAME   /PCM/B06.20/atm/B06.20.atm.1984.nc

METADATA TYPE   XML ▼

→ GET METADATA

QUERY RESULTS

XML

```
?xml version="1.0" encoding="UTF-8"?>
nc:netcdf xmlns:nc="http://www.ucar.edu/schemas/netcdf" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
="/PCM/B06.20/atm/B06.20.atm.1984.nc" xsi:schemaLocation="http://www.ucar.edu/schemas/netcdf
tp://www.ucar.edu/schemas/netcdf.xsd">
    <nc:dimension length="128" name="lon" />
    <nc:dimension length="18" name="lev" />
    <nc:dimension length="19" name="ilev" />
    <nc:dimension length="64" name="lat" />
    <nc:dimension length="81" name="nchar" />
    <nc:dimension isUnlimited="true" length="12" name="time" />
    <nc:variable name="ntrk" type="int">
        <nc:attribute name="long_name" type="string" value="spectral truncation parameter K" />
    </nc:variable>
    <nc:variable name="PRECSC" shape="time lat lon" type="float">
        <nc:attribute name="long_name" type="string" value="Convective snow rate (water equivalent)" />
```

Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop

https://dataportal.ucar.edu:8443/esg/HRM/hrm.jsp

Search Print

Mail AIM Home Radio Netscape Search Shop   Bookmarks ACD CNN ESG GAZZETTA GLOBUS NETS SCD VETS UCAR

Earth System Grid

HRM WEB INTERFACE

STRUCTIONS: Please check all physical files that you wish to transfer. The HRM (Hierarchical Resource Manager) is a product of the Scientific
ta Management Research Group at the Lawrence Berkely National Laboratory. HRM allows fast, reliable, tunable transfer of files to/from disk and
mote storage (HPSS, MSS) through the gridFTP protocol and implementation. This prototype web interface is being developed by the Earth
stem Grid collaboration.

DATA TRANSFER FORM

	PHYSICAL FILE	SIZE	SERVICE
☑	/raid/f1/ESG_SC2002/PCM/B06.20/atm/B06.20.atm.1980.nc	268722384	DISKatNCAR
☑	/dataportal.ucar.edu/PCM1/pcm/B06.20/atm/B06.20.atm.1981.nc	322461980	MSSatNCAR
☑	/hpss.ccs.ornl.gov/home/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1982.nc	322461980	HPSSatORNL
☑	/archive.nersc.gov/nersc/gc5/asim/esg/sc2002/pcm/b06.20/atm/B06.20.atm.1983.nc	322461980	HPSSatLBNL
☑	/data/esg/sc2002/PCM/B06.20/atm/B06.20.atm.1984.nc	322461980	DISKatLBNL

INPUT FILES:

OUTPUT DIRECTORY: /scratch/sc2002/tmp/

USER ID: esguser   (user@host)

gridFTP PARAMETERS:
Block size: 1000000
TCP buffer size: 1000000
Number of streams: 4

SUBMIT REQUEST   RESET FORM

Transferring data from dataportal.ucar.edu...

Print   UCAR

Mail

Earth Sy

Earth System Grid - Netscape

CURRENT GRAM JOB

(this screen will refresh automatically every 5 seconds untill the job is co

ID : https://dataportal.ucar.edu:45714/2235/1047335915/

STATUS : ACTIVE

ERROR : 0

STDOUT :

```
Client Callback CONFIGURATION
base: esguser
source[0]= gsiftp://dataportal.ucar.edu/raid/f1/ESG_SC2002/PCM/B06.20/atm/B06.20.atm.198
target[0]= file:/scratch/sc2002/tmp//B06.20.atm.1980.nc
size[0]= 268722384
source[1]= hrm://dataportal.ucar.edu:6191/HRMServerNCAR/dataportal.ucar.edu/PCM1/pcm/B06
target[1]= file:/scratch/sc2002/tmp//B06.20.atm.1981.nc
size[1]= 322461980
source[2]= hrm://sleepy.ccs.ornl.gov:6191/HRMServerORNL/hpss.ccs.ornl.gov/home/asim/esg/
target[2]= file:/scratch/sc2002/tmp//B06.20.atm.1982.nc
size[2]= 322461980
source[3]= hrm://datagrid.lbl.gov:6191/HRMServerLBNL/archive.nersc.gov/nersc/gc5/asim/es
target[3]= file:/scratch/sc2002/tmp//B06.20.atm.1983.nc
size[3]= 322461980
source[4]= gsiftp://datagrid.lbl.gov/data/esg/sc2002/PCM/B06.20/atm/B06.20.atm.1984.nc
target[4]= file:/scratch/sc2002/tmp//B06.20.atm.1984.nc
```

e Scientific
from disk and
e Earth

ERVICE

SKatNCAR

SatNCAR

SSatORNL

SSatLBNL

SKatLBNL

OUTPUT DIRECTORY: /scratch/sc2002/tmp/

USER ID: esguser   (user@host)

| Block size: | 1000000 |
gridFTP PARAMETERS: | TCP buffer size: | 1000000 |
| Number of streams: | 4 |

SUBMIT REQUEST   **RESET FORM**

THE EARTH SYSTEM GRID

ESG

Scientific Discovery through Advanced Computing
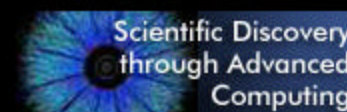
ESG Home	ESG Login	CAS proxy	ESG Logout	ESG @ Work:

ESG LAS CONFIGURATION INTERFACE

INSTRUCTIONS: Submitting this form will regenerate the configuration file of the local LAS server. This process may take a little time. Please select all files that you will want to be accessible by LAS.

LAS DATA FILES

☑ /scratch/sc2002/tmp/B06.20.atm.1980.nc

☑ /scratch/sc2002/tmp/B06.20.atm.1981.nc

☑ /scratch/sc2002/tmp/B06.20.atm.1982.nc

☑ /scratch/sc2002/tmp/B06.20.atm.1983.nc

☑ /scratch/sc2002/tmp/B06.20.atm.1984.nc

➡ **SUBMIT** (configuration may take a little time...)

SESION ID: 00AFCA2870A97FD8E572993D94F16BBB   **PROXY TIME LEFT:** 6581 secs

N: CN=proxy,CN=proxy,CN=proxy,CN=Globus User,OU=Network Engineering and Technology Section,OU=Scientific Computing Division,O=National Center for Atmospheric Research,O=Globus,C=us

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Live Access to Climate Data

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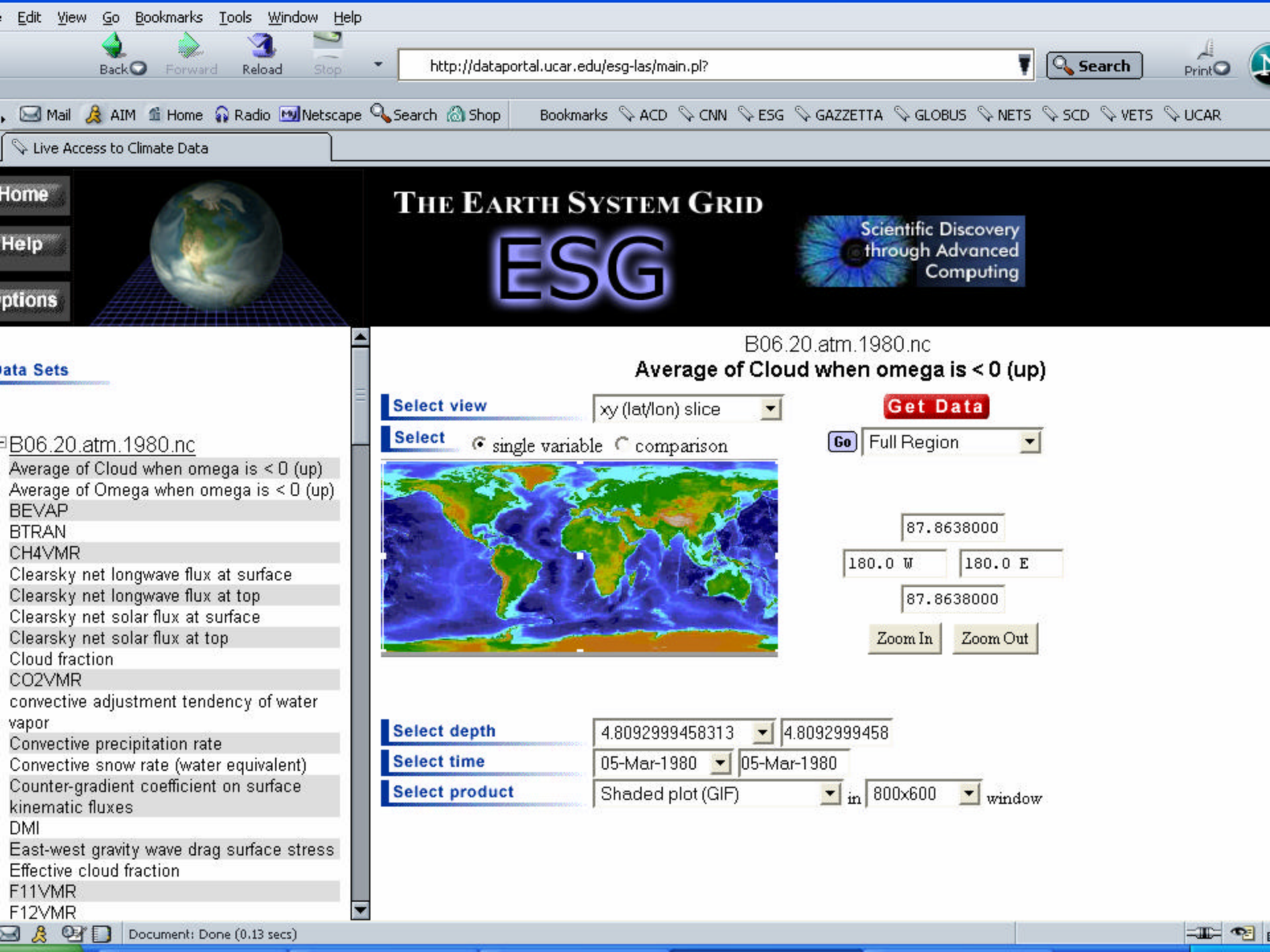
ata Sets

B06.20.atm.1980.nc
Average of Cloud when omega is < 0 (up)
Average of Omega when omega is < 0 (up)
BEVAP
BTRAN
CH4VMR
Clearsky net longwave flux at surface
Clearsky net longwave flux at top
Clearsky net solar flux at surface
Clearsky net solar flux at top
Cloud fraction
CO2VMR
convective adjustment tendency of water vapor
Convective precipitation rate
Convective snow rate (water equivalent)
Counter-gradient coefficient on surface kinematic fluxes
DMI
East-west gravity wave drag surface stress
Effective cloud fraction
F11VMR
F12VMR

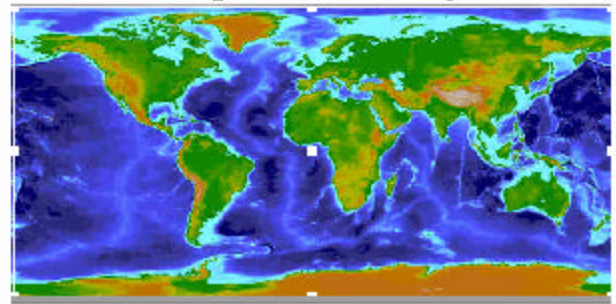B06.20.atm.1980.nc
Average of Cloud when omega is < 0 (up)

Select view xy (lat/lon) slice

Select ⦿ single variable ○ comparison

Get Data

Go Full Region

87.8638000
180.0 W   180.0 E
87.8638000

Zoom In Zoom Out

Select depth 4.8092999458313 | 4.8092999458
Select time 05-Mar-1980 | 05-Mar-1980
Select product Shaded plot (GIF) in 800x600 window

Document: Done (0.13 secs)

Edit View

Back

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Help

ptions

Net longwave
Net radiative fl
Net solar flux
Net solar flux
North-south g
stress
O3VMR
ocean (0), lan
OCNFRAC
PBL height
Percentage of
Perturbation s
PBL)
Perturbation te
Q tendency -
Q850
QBOT
QDRAI
QINFL
QOVER
Random overl
amount
Reference hei
Relative humi
RSW
Sea level pre
Solar heating
Solar insolatio
specific humic

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http://dataportal.u...=&targetURL=&state=   UCAR

TIME : 05-MAR-1980 00   DATA SET: B06.20.atm.1980.nc

Sea level pressure (Pa)

Modify plot